HAZARDOUS MATERIAL & OXYGEN SENSOR SYSTEM GENERAL NOTES

1. THIS DESIGN PROVIDES A NEW SIEMENS PAD-3 AUXILIARY POWER SUPPLY FOR A HAZARDOUS MATERIAL SPILL ALARM SYSTEM TO INTERFACE WITH THE NEW SIEMENS MXL FIRE ALARM SYSTEM. THE DESIGN AND ARRANGEMENT OF THE FIRE DETECTION AND FIRE ALARM SYSTEM FOR THE MOLECULAR FOUNDRY IS SHOWN ON OTHER DRAWING SHEETS. ALL INITIATING DEVICES & HAZARDOUS MATERIAL SPILL ALARM NOTIFICATION APPLIANCES SHALL BE COMPATIBLE WITH THE SIEMENS MXL FIRE ALARM CONTROL UNIT (FACU) AND THE SIEMENS PAD-3. THE DEVICES AND APPLIANCES SHALL BE PROVIDED AND INSTALLED AS INDICATED IN THE DRAWINGS, NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 72, NATIONAL FIRE ALARM CODE, AND THE SYSTEM SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S LISTINGS AND APPROVALS.
2. THE HAZARDOUS MATERIAL SPILL ALARM CONDUCTORS AND CABLE SHALL BE ROUTED IN THE FIRE ALARM SYSTEM RACEWAY (E.G. CONDUIT) AND SHALL BE PROVIDED IN ACCORDANCE WITH THE UNIVERSITY'S STANDARDS AND THESE CONTRACT DOCUMENTS.
3. THESE DRAWINGS ARE DIAGRAMMATIC IN THAT EXACT DEVICE, APPLIANCE, AND EQUIPMENT LOCATIONS, CONDUIT ROUTING, CONDUIT SUPPORT AND CONSTRUCTION DETAILS ARE TO BE DEVELOPED BY THE SUBCONTRACTOR.
4. THE RISER DIAGRAMS ARE DIAGRAMMATIC AND REPRESENT FEASIBLE CONNECTIVITY. REMOTE POWER SUPPLIES ARE SHOWN. THE SUBCONTRACTOR MAY MODIFY THE CONNECTIVITY TO SUIT FIELD CONDITIONS PROVIDED THAT THE NOTIFICATION APPLIANCE AND SIGNALING LINE CIRCUIT LOADS DO NOT EXCEED THOSE SPECIFIED IN THE LISTINGS AND APPROVALS FOR EACH MANUFACTURER'S PIECE OF EQUIPMENT.
5. THE PAD-3 SHALL BE LOCATED AS SHOWN IN THE DRAWINGS (5TH FLOOR FIRE CONTROL ROOM). THE PAD-3 SHALL BE INSTALLED AT A HEIGHT SUCH THAT ITS TOP IS NO HIGHER THAN OF 5'-6" AFF AND THAT ITS BOTTOM IS NO LESS THAN 2'-0" AFF. THE PAD-3 SHALL COMMUNICATE WITH THE MXL FIRE ALARM CONTROL UNIT.
6. OPERATION OF ANY HAZARDOUS MATERIAL SPILL ALARM (BLUE MANUAL PULL STATION) SHALL CAUSE ALL AUDIBLE/VISUAL HAZARDOUS MATERIAL SPILL ALARM NOTIFICATION APPLIANCES TO OPERATE (USING A CONTINUOUS TONE), SHALL ALSO CAUSE A TROUBLE SIGNAL TO BE TRANSMITTED TO THE UNIVERSITY'S RECEIVER VIA THE NEW COMMUNICATION LINK TO THE MXL CONTROL UNIT IN BUILDING 66, AND SHALL CAUSE AN ALARM TO BE TRANSMITTED TO THE FMCS VIA THE MXL CONTROL UNIT.
7. OPERATION OF ANY OXYGEN SENSOR ALARM (STAND-ALONE SYSTEM PROVIDED BY OTHER SECTIONS) SHALL CAUSE CAUSE A TROUBLE SIGNAL TO BE TRANSMITTED TO THE UNIVERSITY'S RECEIVER VIA THE NEW COMMUNICATION LINK TO THE MXL CONTROL UNIT IN BUILDING 66, AND SHALL CAUSE AN ALARM TO BE TRANSMITTED TO THE FMCS VIA THE MXL CONTROL UNIT.
8. ANY PAD-3 SUPERVISORY OR TROUBLE SIGNAL SHALL CAUSE A LOCAL ALARM AT THE FACU TO OPERATE AND SHALL ALSO CAUSE A SUPERVISORY/TROUBLE SIGNAL TO BE TRANSMITTED TO THE UNIVERSITY'S RECEIVER VIA THE MXL IN BUILDING 66.
9. WIRING FOR THE HAZARDOUS MATERIAL SPILL ALARM NOTIFICATION APPLIANCE CIRCUITS SHALL BE #14 AWG SOLID THHN, ORANGE POSITIVE, YELLOW NEGATIVE.
10. ALL WIRING SHALL BE INSTALLED IN COMPLIANCE WITH THE CALIFORNIA ELECTRICAL CODE (SPECIFICALLY ARTICLE 760) AND NFPA 72, NATIONAL FIRE ALARM CODE.
11. THE HAZARDOUS MATERIAL SPILL ALARM MANUAL PULL STATIONS SHALL BE BLUE IN COLOR AND FACTORY LABELED AS "HAZARDOUS MATERIAL SPILL ALARM."
12. THE HAZARDOUS MATERIAL SPILL ALARM NOTIFICATION APPLIANCES SHALL UTILIZE A BLUE COLORED LENS OVER THE STROBE, SHALL UTILIZE A CONTINUOUS SOUNDING TONE AND SHALL BE LABELED AS "HAZARDOUS MATERIAL SPILL."

HAZARDOUS MATERIAL SPILL ALARM VOTAGE DROP CALCULATIONS

VOLTAGE DROP CALCULATIONS: HM A1

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
HM A1-8	0.019	0.019	35	70	14	3.26	0.0043
HM A1-7	0.019	0.038	40	80	14	3.26	0.0099
HM A1-6	0.019	0.057	100	200	14	3.26	0.0372
HM A1-5	0.019	0.076	60	120	14	3.26	0.0297
HM A1-4	0.019	0.095	35	70	14	3.26	0.0217
HM A1-3	0.019	0.114	25	50	14	3.26	0.0186
HM A1-2	0.019	0.133	60	120	14	3.26	0.0520
HM A1-1	0.019	0.152	220	440	14	3.26	0.2180
		Total Load: 0.152				Total V-Drop	0.3915

23.6085 VOLTS REMAINING (within the voltage range of the appliances)
0.152 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

TYPE	MAKE	MODEL	CANDELA	LOAD	V-RANGE	NOTE
HORN	WHEELOCK	NS4	NA	0.019	16-33	

VOLTAGE DROP CALCULATIONS: HM V1

Voltage Drop = (L/1000)(A)(R)
Where:
L = Conductor Distance (twice actual distance)
A = Load (amps)
R = Resistance per 1,000 ft (NEC Table 8)

Appliance Type	Appliance Load (amps)	Cummulative Load (amp)	Actual Distance (ft)	Conductor Distance (ft)	Conductor Gauge	Resistance per 1,000 ft	Voltage Drop
HM A1-8	0.148	0.148	35	70	14	3.26	0.0338
HM A1-7	0.148	0.296	40	80	14	3.26	0.0772
HM A1-6	0.178	0.474	100	200	14	3.26	0.3090
HM A1-5	0.178	0.652	60	120	14	3.26	0.2551
HM A1-4	0.178	0.83	35	70	14	3.26	0.1894
HM A1-3	0.178	1.008	25	50	14	3.26	0.1643
HM A1-2	0.178	1.186	60	120	14	3.26	0.4640
HM A1-1	0.178	1.364	220	440	14	3.26	1.9565
		Total Load: 1.364				Total V-Drop	3.4493

20.5507 VOLTS REMAINING (within the voltage range of the appliances)
1.364 TOTAL AMPS REQUIRED (within the listed power supply output)

NOTIFICATION APPLIANCES:

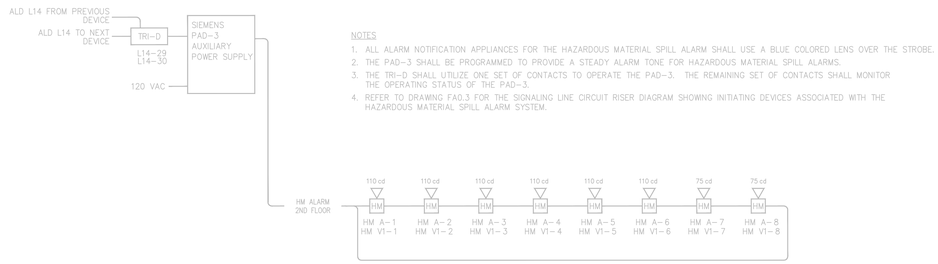
TYPE	MAKE	MODEL	CANDELA	LOAD	V-RANGE	NOTE
STROBE	WHEELOCK	NS4	75	0.148	16-33	MULTI CANDELA
STROBE	WHEELOCK	NS4	110	0.178	16-33	MULTI CANDELA

HAZARDOUS MATERIAL & OXYGEN SENSOR SYSTEMS

SYSTEM EVENT	ANNUNCIATE EVENT AT FACU	TROUBLE SIGNAL TO LBNL RECEIVER	ALARM SIGNAL TO FMCS	OPERATE HAZ MAT NOTIFICATION APPLIANCES
HAZARDOUS MATERIAL SPILL ALARM (CLEAN ROOM) MANUAL PULL STATION	●	●	●	●
OXYGEN SENSOR ALARM (RM 4126)	●	●	●	
OXYGEN SENSOR ALARM (RM 6220)	●	●	●	
PAD 3 TROUBLE	●	●		

NOTE 1: THIS FUNCTION CHART IDENTIFIES AUTOMATIC ACTIONS FOR THE HAZARDOUS MATERIAL SPILL ALARM AND OXYGEN SENSORS, ONLY. REFER TO THE FUNCTION CHARTS ON OTHER SHEETS FOR OTHER FUNCTIONS AND ACTIONS PERFORMED BY THE FIRE ALARM SYSTEM.

HAZARDOUS MATERIAL SPILL ALARM RISER DIAGRAM

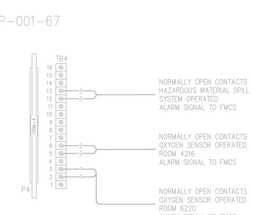


NOTES
1. ALL ALARM NOTIFICATION APPLIANCES FOR THE HAZARDOUS MATERIAL SPILL ALARM SHALL USE A BLUE COLORED LENS OVER THE STROBE.
2. THE PAD-3 SHALL BE PROGRAMMED TO PROVIDE A STEADY ALARM TONE FOR HAZARDOUS MATERIAL SPILL ALARMS.
3. THE TRI-D SHALL UTILIZE ONE SET OF CONTACTS TO OPERATE THE PAD-3. THE REMAINING SET OF CONTACTS SHALL MONITOR THE OPERATING STATUS OF THE PAD-3.
4. REFER TO DRAWING FA0.3 FOR THE SIGNALING LINE CIRCUIT RISER DIAGRAM SHOWING INITIATING DEVICES ASSOCIATED WITH THE HAZARDOUS MATERIAL SPILL ALARM SYSTEM.

FIRE ALARM SYSTEM LEGEND

- L1-01 — SMOKE DETECTOR, ADDRESS AS NOTED
- L1-02 (DS) — DUCT SMOKE DETECTOR, ADDRESS AS NOTED
- L1-03 — FIRE CALL BOX, ADDRESS AS NOTED
- L1-04 RI — SMOKE DETECTOR WITH REMOTE INDICATOR, ADDRESS AS NOTED
- L1-04 RB — SMOKE DETECTOR WITH RELAY BASE, ADDRESS AS NOTED
- L1-04 — SIDEWALL MOUNTED SMOKE DETECTOR, ADDRESS AS NOTED
- FACU — FIRE ALARM SYSTEM CONTROL UNIT (MXL)
- V-01 15 cd (S) — STROBE, APPLIANCE NUMBER & MINIMUM CANDELA RATING AS NOTED
- A-01 110 cd (AV) — HORN/STROBE, APPLIANCE NUMBER AND MINIMUM CANDELA AS NOTED
- A-01 (H) — HORN, APPLIANCE NUMBER AND MINIMUM CANDELA AS NOTED
- RCC — REMOTE COMMAND CENTER (RCC-2)
- L1-05 (VS) — FIRE SPRINKLER VALVE SUPERVISORY SWITCH, ADDRESS AS NOTED
- L1-06 (WF) — FIRE SPRINKLER WATERFLOW SWITCH, ADDRESS AS NOTED
- DH — DOOR HOLDER (INSTALLED UNDER SEPARATE SECTION)
- TRI-R — INTELLIGENT INTERFACE MODULE
- HM — HAZARDOUS MATERIAL SPILL ALARM PULL STATION
- HM — HAZARDOUS MATERIAL SPILL ALARM
- HSSD — HIGH SENSITIVITY SMOKE DETECTOR (HSSD)
- HSSD SAMPLE PIPING AND SAMPLE ORIFICE
- RU — ROLL-UP DOOR RELEASE (INSTALLED UNDER SEPARATE SECTION)
- FSD — FIRE SMOKE DAMPER (INSTALLED UNDER SEPARATE SECTION)
- EOL — END-OF-LINE DEVICE
- J — JUNCTION BOX
- FIRE ALARM CONDUIT (3/4-INCH UNLESS OTHERWISE NOTED)
- FIRE ALARM CIRCUIT IDENTIFICATION
  - L1/L2 — 1-PAIR; SLC/IDC LOOP (L1 THROUGH L14)
  - A1 — 1 PAIR #14; AUDIBLE NAC CIRCUIT (A1 THROUGH A8)
  - V1/V2/V3 — 1 PAIR #14; VISUAL NAC CIRCUIT (V1 THROUGH V20)
  - RCC — 1 RS232 FOR REMOTE ANNUNCIATION
  - (TYPICAL UNO) — TYPICAL UNLESS NOTED OTHERWISE

CRM-4 MODULE WIRING DIAGRAM DETAIL



Lawrence Berkeley National Laboratory

Molecular Foundry Building

Issued for — Rev Date

RECORD DRAWINGS — 18 JAN 2007

Seals and Signatures

RECORD DRAWINGS

SPECIAL NOTE:
THE INFORMATION SHOWN IN THIS DRAWING WAS DEVELOPED USING THE RECORD DRAWINGS PROVIDED BY SIEMENS BUILDING TECHNOLOGIES, INC. FOLLOWING THE COMPLETION OF THIS PROJECT (IDENTIFIED AS JOB NUMBER 107739, SHEETS 1 THROUGH 24). SPECIFICALLY, SEE SHEET 11 OF 24 FOR INFORMATION.

LBNL Project Title: MOLECULAR FOUNDRY
LBNL Building Number: 67

Key Plan

Drawing Title
FIRE ALARM SYSTEM HAZARDOUS MATERIAL & OXYGEN SENSOR SYSTEMS

Scale: MF1212

SG Project Number — LBNL Project Number
FA0.12

Drawing Number: 12 OF 20

LBNL Drawing Number: 5N67E021
IFB 841

Plot Sheet Filename: X:\DES\JOBNUMBER\FILENAME
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Named Plot Style: NONE
Plot Layout: PSPACE SHEET @ 1:1
Plot Date:

LBNL Drawing Status:
LBNL Issue Status:
LBNL Revision:
LBNL Date: